

REMARKS/ARGUMENTS

Applicants would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office Action. Favorable reconsideration of the application is requested in view of the remarks and amendments made herein.

Claims 1–2 and 11 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kurosawa (U.S. Patent No. 6,709,543) in view of either Odajima et al. (U.S. Patent Publication 2001/0029088) or Tsujimoto (U.S. Patent Publication 2003/0070517). Traversal of this rejection is made for at least the following reasons. The examiner concedes that Kurosawa does not disclose a bent range set in a direction with a predetermined angle of about 45 degrees with respect to a side of the chip and thus relies on Odajima or Tsujimoto in an attempt to make up for the deficiencies of Kurosawa. However, the angle when peeling the tape from the wafer in Odajima and Tsujimoto has nothing to do with the bent range being set in a direction which forms a predetermined angle with respect to one side of the semiconductor chip. Moreover, Odajima expressly teaches away from the semiconductor pickup device and method disclosed in Kurosawa. Specifically, Kurosawa is directed to a pickup jig that separates semiconductor chips affixed to an adhesive sheet by using a plurality of thrust pins to thrust up the semiconductor chip while drawing a vacuum on an inside of a holder to hold the adhesive sheet by suction. Odajima criticizes this separation method of Kurosawa in the Background of the Invention section. Odajima states:

In the conventional art 1, there is described that bonding force or power between the adhesive sheet and the semiconductor chip(s) is weakened by rubbing the reverse surface of the adhesive sheet, on which the semiconductor chips to be removed are attached, by means of a movable pin(s), while the semiconductor chip is lifted up, equally, with elevating thrust pins provided around the movable pin(s) together therewith, thereby separating or removing the

semiconductor chip(s) from the adhesive sheet, the bonding force of which is weakened. (paragraph [0003])

...

However, in the conventional art 1 mentioned above, since the semiconductor chip is separated from the adhesive sheet by lifting up the semiconductor chip, equally, while elevating the movable pin together with the thrust pins provided around the movable pin, therefore the area for separation is small with respect to that of the adhesive surface on the semiconductor chip, in particular, in a case of the thin semiconductor chip, there is high possibility that the thin semiconductor chip cannot be separated but is rather broken or injured. (paragraph [0007])

Odajima, thus, is directed to a new solution of separating the semiconductor element from an adhesive in order to avoid the apparatus and method disclosed in Kurosawa. There is nothing within either of Kurosawa or Odajima to suggest the desirability of the proposed combination. Accordingly, the proposed combination of Kurosawa and Odajima is improper.

Likewise, there is no teaching, suggestion, or motivation to combine Kurosawa and Tsujimoto in the manner proposed by the examiner. Tsujimoto discloses a method in which an adhesive tape with a specified length is attached to an end portion of a protective sheet, which can then be peeled away from a semiconductor element by pulling the adhesive tape. More specifically, the invention of Tsujimoto is directed peeling the protective sheet from the semiconductor element after a dicing operation and prior to a grinding operation. In contrast and as stated above, Kurosawa is directed to an apparatus and method in which thrust pins are used to thrust up a semiconductor element while a vacuum is used to separate an adhesive from the element. Once the adhesive is separated from the element, the element is picked up and subjected to a mounting process. There is no peeling operation in Kurosawa. Further, while Tsujimoto does disclose that the protective sheet can be peeled at a 45-degree angle, there is nothing that discloses that peeling at such an angle

lessens the chance of breaking a chip, as contended by the examiner. Rather, it is the timing of the peeling operation (i.e., between the dicing and grinding operations) that avoid breakage and damage to the chips. Thus, there is nothing within Tsujimoto that would have suggested to one skilled in the art to modify the apparatus and method of Kurosawa to provide a bent range set in a direction with a predetermined angle of about 45 degrees with respect to a side of the chip. The proposed combination of Kurosawa and Tsujimoto is improper.

Further, in order to expedite prosecution of the present application, the independent claims have been amended herein to require that the sheet be exfoliated from a lower surface of the semiconductor chip using only the vacuum suction force. Using only the vacuum suction force mitigates the possibility of the chips cracking and the need for a complication mechanism employing thrust pins.

For at least the reasons discussed above, the combination of Kurosawa and either Odajima or Tsujimoto does not teach or suggest each limitation set forth in claims 1, 2, and 11. Accordingly, withdrawal of this rejection is respectfully requested.

Claims 5–10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Akira (JP 2001-118862) in view of Kurosawa (U.S. Patent No. 6,709,543) and either Odajima et al. (U.S. Patent Publication 2001/0029088) or Tsujimoto (U.S. Patent Publication 2003/0070517). Traversal of this rejection is made for at least the following reasons. As stated above, the combination of Kurosawa and either Odajima or Tsujimoto is improper as Kurosawa is directed to a separation method using thrust pins and a vacuum source; while both Odajima and Tsujimoto use peeling operations. Further, Odajima expressly discourages teaches away from the thrust pin and vacuum methods disclosed in Kurosawa in favor of the peeling methods disclose in Odajima and Tsujimoto.

Akira does not make up for the deficiencies of Kurosawa. The examiner concedes that Akira fails to show the semiconductor chip to be bent.

As stated above, in order to expedite prosecution of the present application, the independent claims have been amended herein to require that the sheet be exfoliated from a lower surface of the semiconductor chip using only the vacuum suction force. Using only the vacuum suction force mitigates the possibility of the chips cracking and the need for a complication mechanism employing thrust pins.

For at least these reasons, the combination of Akira, Kurosawa, and either Odajima or Tsujimoto cannot render obvious claims 5-10. Withdrawal of this rejection is respectfully requested.

In light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 16-0820, our Order No. 35857.

Respectfully submitted,
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